

CLAIMS

1. An apparatus for electromagnetic compatibility-driven design, said
2 apparatus comprising:

an electromagnetic field calculator configured and arranged to receive
4 (A) placement information relating to a relative placement of a plurality of circuit
components and (B) at least one emissions profile, each emissions profile
6 corresponding to one among the plurality of circuit components; and

an electromagnetic interference calculator coupled to the
8 electromagnetic field calculator and configured and arranged to receive at least
one susceptibility profile, each susceptibility profile corresponding to one among
10 the plurality of circuit components,

wherein the electromagnetic field calculator is further configured and
12 arranged to output information regarding an induced electromagnetic field, and

wherein the electromagnetic interference calculator is further configured
14 and arranged to receive the information regarding an induced electromagnetic
field and to output information regarding effects caused by the induced
16 electromagnetic field.

2. The apparatus for electromagnetic compatibility-driven design
2 according to claim 1, wherein the electromagnetic field calculator is further
configured and arranged to receive a circuit description, the circuit description
4 including (E) at least one circuit component characterization, each circuit
component characterization corresponding to one among the plurality of circuit
6 components, and (F) connectivity information, said connectivity information
relating to at least one electrical pathway, each electrical pathway connecting at
8 least two among the plurality of circuit components.

3. The apparatus for electromagnetic compatibility-driven design
2 according to claim 2, wherein the circuit description includes a schematic
representation.

4. The apparatus for electromagnetic compatibility-driven design
2 according to claim 2, wherein the circuit description includes a plurality of
expressions in a hardware description language.

5. The apparatus for electromagnetic compatibility-driven design
2 according to claim 2, wherein the circuit description includes a netlist.

6. The apparatus for electromagnetic compatibility-driven design
2 according to claim 1, wherein the electromagnetic field calculator is further
configured and arranged to receive information relating to at least one among a
4 characteristic and a location of an electromagnetic shielding element.

7. The apparatus for electromagnetic compatibility-driven design
2 according to claim 1, wherein each among said at least one emissions profile
includes results of a plurality of electromagnetic near-field measurements.

8. The apparatus for electromagnetic compatibility-driven design
2 according to claim 7, wherein for at least one emissions profile, each among
said plurality of electromagnetic near-field measurements is associated with a
4 location in a grid, said grid having at least two spatial dimensions.

9. The apparatus for electromagnetic compatibility-driven design
2 according to claim 7, wherein for at least one emissions profile, each among
said plurality of electromagnetic near-field measurements includes an amplitude
4 and a direction.

10. The apparatus for electromagnetic compatibility-driven design
2 according to claim 1, wherein the placement information includes information
relating to relative spatial locations and orientations among said plurality of
4 circuit components.

11. The apparatus for electromagnetic compatibility-driven design
2 according to claim 10, wherein the placement information includes information
relating to relative spatial dimensions of said plurality of circuit components.

12. The apparatus for electromagnetic compatibility-driven design
2 according to claim 1, wherein each among said at least one emissions profile
includes results of a plurality of electromagnetic near-field measurements, and
4 wherein for at least one emissions profile, each among said plurality of
electromagnetic near-field measurements is associated with a location in a grid,
6 said grid having boundaries and at least two spatial dimensions, and

wherein the information regarding an induced electromagnetic field
8 includes a plurality of amplitudes of the induced electromagnetic field, and

wherein each among the plurality of amplitudes corresponds to one
10 among a plurality of spatial locations, and

wherein at least one among the plurality of spatial locations lies outside
12 the boundaries of said grid.

13. The apparatus for electromagnetic compatibility-driven design
2 according to claim 1, wherein each susceptibility profile represents a response
of the corresponding circuit component to an electromagnetic field produced by
4 a source of predetermined character and location.

14. A method for electromagnetic compatibility-driven design, said
2 method comprising:

calculating an induced electromagnetic field based on (A) placement
4 information relating to a relative placement of a plurality of circuit components
and (B) at least one emissions profile, each emissions profile corresponding to
6 one among the plurality of circuit components, and

calculating effects of the induced electromagnetic field based on at least
8 one susceptibility profile, each susceptibility profile corresponding to one among
the plurality of circuit components.

15. The method for electromagnetic compatibility-driven design
2 according to claim 14, wherein calculating an induced electromagnetic field is
based on a circuit description including (E) at least one circuit component
4 characterization, each circuit component characterization corresponding to one
among the plurality of circuit components, and (F) connectivity information, said
6 connectivity information relating to at least one electrical pathway, each
electrical pathway connecting at least two among the plurality of circuit
8 components.

16. The method for electromagnetic compatibility-driven design
2 according to claim 15, further comprising calculating a simulated circuit
operation based on the placement information, the circuit description, and the
4 calculated effects of the induced electromagnetic field.

17. The method for electromagnetic compatibility-driven design
2 according to claim 16, further comprising comparing a result of said calculating
a simulated circuit operation to at least one predetermined criterion.

18. The method for electromagnetic compatibility-driven design
2 according to claim 17, further comprising modifying at least one among the
circuit description and the placement information based on a result of said
4 comparing.

19. The method for electromagnetic compatibility-driven design
2 according to claim 15, wherein the circuit description includes a schematic
representation.

20. The method for electromagnetic compatibility-driven design
2 according to claim 15, wherein the circuit description includes a plurality of
expressions in a hardware description language.

21. The method for electromagnetic compatibility-driven design
2 according to claim 15, wherein the circuit description includes a netlist.

22. The method for electromagnetic compatibility-driven design
2 according to claim 14, wherein calculating an induced electromagnetic field
calculator is based on information relating to at least one among a characteristic
4 and a location of an electromagnetic shielding element.

23. The method for electromagnetic compatibility-driven design
2 according to claim 14, wherein each among said at least one emissions profile
includes results of a plurality of electromagnetic near-field measurements.

24. The method for electromagnetic compatibility-driven design
2 according to claim 23, wherein for at least one emissions profile, each among
said plurality of electromagnetic near-field measurements is associated with a
4 location in a grid, said grid having at least two spatial dimensions.

25. The method for electromagnetic compatibility-driven design
2 according to claim 23, wherein for at least one emissions profile, each among
said plurality of electromagnetic near-field measurements includes an amplitude
4 and a direction.

26. The method for electromagnetic compatibility-driven design
2 according to claim 14, wherein the placement information includes information
relating to relative spatial locations and orientations among said plurality of
4 circuit components.

27. The method for electromagnetic compatibility-driven design
2 according to claim 26, wherein the placement information includes information
relating to relative spatial dimensions of the plurality of circuit components.

28. The method for electromagnetic compatibility-driven design
2 according to claim 14, wherein each among said at least one emissions profile
includes results of a plurality of electromagnetic near-field measurements, and

wherein for at least one emissions profile, each among said plurality of electromagnetic near-field measurements is associated with a location in a grid, said grid having boundaries and at least two spatial dimensions, and

wherein the information regarding an induced electromagnetic field includes a plurality of amplitudes of the induced electromagnetic field, and

wherein each among said plurality of amplitudes corresponds to one among a plurality of spatial locations, and

wherein at least one among said plurality of spatial locations lies outside the boundaries of said grid.

29. The method for electromagnetic compatibility-driven design according to claim 14, wherein each susceptibility profile represents a response of the corresponding circuit component to an electromagnetic field produced by a source of predetermined character and location.

30. A method for electromagnetic compatibility-driven design, said method comprising:

receiving a circuit description including (A) at least one circuit component characterization, each circuit component characterization corresponding to at least one among a plurality of circuit components, and (B) connectivity information relating to at least one electrical pathway, each electrical pathway connecting at least two among the plurality of circuit components;

based on the circuit description, calculating placement information relating to a relative placement of the plurality of circuit components;

based on the placement information and at least one emissions profile, calculating an induced electromagnetic field; and

- 12 based on at least one susceptibility profile, calculating effects of the
induced electromagnetic field,
- 14 wherein each emissions profile corresponds to one among the plurality of
circuit components, and
- 16 wherein each susceptibility profile corresponds to one among the plurality
of circuit components.

31. The method for electromagnetic compatibility-driven design
2 according to claim 30, further comprising calculating a simulated circuit
operation based on the placement information, the circuit description, and the
4 calculated effects of the induced electromagnetic field.

32. The method for electromagnetic compatibility-driven design
2 according to claim 31, further comprising comparing a result of said calculating
a simulated circuit operation to at least one predetermined criterion.

33. The method for electromagnetic compatibility-driven design
2 according to claim 32, further comprising modifying at least one among the
circuit description and the placement information based on a result of said
4 comparing.

34. A data storage medium having machine-readable code, the
2 machine-readable code including instructions executable by an array of logic
elements, said instructions defining a method for electromagnetic compatibility-
4 driven design comprising:

calculating an induced electromagnetic field based on (A) placement
6 information relating to a relative placement of a plurality of circuit components

and (B) at least one emissions profile, each emissions profile corresponding to
8 one among the plurality of circuit components, and

calculating effects of the induced electromagnetic field based on at least
10 one susceptibility profile, each susceptibility profile corresponding to one among
the plurality of circuit components.

35. The data storage medium according to claim 34, wherein
2 calculating an induced electromagnetic field is based on a circuit description
including (E) at least one circuit component characterization, each circuit
4 component characterization corresponding to one among the plurality of circuit
components, and (F) connectivity information, said connectivity information
6 relating to at least one electrical pathway, each electrical pathway connecting at
least two among the plurality of circuit components.

36. The data storage medium according to claim 35, further
2 comprising calculating a simulated circuit operation based on the placement
information, the circuit description, and the calculated effects of the induced
4 electromagnetic field.

37. The data storage medium according to claim 36, further
2 comprising comparing a result of said calculating a simulated circuit operation to
at least one predetermined criterion.

38. The data storage medium according to claim 37, further
2 comprising modifying at least one among the circuit description and the
placement information based on a result of said comparing.

39. The data storage medium according to claim 35, wherein the
2 circuit description includes a schematic representation.

40. The data storage medium according to claim 35, wherein the
2 circuit description includes a plurality of expressions in a hardware description
language.

41. The data storage medium according to claim 35, wherein the
2 circuit description includes a netlist.

42. The data storage medium according to claim 34, wherein
2 calculating an induced electromagnetic field calculator is based on information
relating to at least one among a characteristic and a location of an
4 electromagnetic shielding element.

43. The data storage medium according to claim 34, wherein each
2 among said at least one emissions profile includes results of a plurality of
electromagnetic near-field measurements.

44. The data storage medium according to claim 43, wherein for at
2 least one emissions profile, each among said plurality of electromagnetic near-
field measurements is associated with a location in a grid, said grid having at
4 least two spatial dimensions.

45. The data storage medium according to claim 43, wherein for at least one emissions profile, each among said plurality of electromagnetic near-field measurements includes an amplitude and a direction.

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46. The data storage medium according to claim 34, wherein the placement information includes information relating to relative spatial locations and orientations among said plurality of circuit components.

47. The data storage medium according to claim 46, wherein the placement information includes information relating to relative spatial dimensions of the plurality of circuit components.

48. The data storage medium according to claim 34, wherein each among said at least one emissions profile includes results of a plurality of electromagnetic near-field measurements, and

wherein for at least one emissions profile, each among said plurality of electromagnetic near-field measurements is associated with a location in a grid, said grid having boundaries and at least two spatial dimensions, and

wherein the information regarding an induced electromagnetic field includes a plurality of amplitudes of the induced electromagnetic field, and

wherein each among said plurality of amplitudes corresponds to one among a plurality of spatial locations, and

wherein at least one among said plurality of spatial locations lies outside the boundaries of said grid.

49. The data storage medium according to claim 34, wherein each
2 susceptibility profile represents a response of the corresponding circuit
component to an electromagnetic field produced by a source of predetermined
4 character and location.

50. A data storage medium having machine-readable code, the
2 machine-readable code including instructions executable by an array of logic
elements, said instructions defining a method for electromagnetic compatibility-
4 driven design, said method comprising:

receiving a circuit description including (A) at least one circuit component
6 characterization, each circuit component characterization corresponding to at
least one among a plurality of circuit components, and (B) connectivity
8 information relating to at least one electrical pathway, each electrical pathway
connecting at least two among the plurality of circuit components;

10 based on the circuit description, calculating placement information
relating to a relative placement of the plurality of circuit components;

12 based on the placement information and at least one emissions profile,
calculating an induced electromagnetic field; and

14 based on at least one susceptibility profile, calculating effects of the
induced electromagnetic field,

16 wherein each emissions profile corresponds to one among the plurality of
circuit components, and

18 wherein each susceptibility profile corresponds to one among the plurality
of circuit components.

51. The data storage medium according to claim 50, further
2 comprising calculating a simulated circuit operation based on the placement

- information, the circuit description, and the calculated effects of the induced
4 electromagnetic field.

52. The data storage medium according to claim 51, further
2 comprising comparing a result of said calculating a simulated circuit operation to
at least one predetermined criterion.

53. The data storage medium according to claim 52, further
2 comprising modifying at least one among the circuit description and the
placement information based on a result of said comparing.

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